RadNet Source Check Message

2/19/2004 8:55 PM

RadNet Source Check Message
Thursday, February 19, 2004

RadNet Source Check Message

2/19/2004 8:55 PM

Check Source Message Header

Once the instrument receives the Check Source Message, it should start shipping data (using the appropriate protocol) at the abnormal push rate. The instrument should change its operational status (code 23) to indicate the check source mode. When the instrument completes the source check, it will change its operational status from the check source mode (Code 23) to a check source results (Code 38) and will also include the final results using the appropriate protocol message. The instrument will then return to the normal push rate.

The Check Source Message (Byte 3 of the RadNet header, code = 3) instructs the instrument to perform a source check. The client software will send a standard RadNet Header Message to an individual instrument or broadcast to it to several instruments on a subnet. The client software must set the appropriate fields within the header, such as setting byte 3 to a value of 3.

The instrument/PC/Interface Hardware/ Translation Protocol Converter (*TPC) must be capable of handling the RadNet Diagnostic/Self-Check message. This can be done using the following methods:

a. The receiving computer/TPC translates the RadNet Check Source Message into the instrument's native code and sends this code to the instrument. Such as a computer connected to instrument using RS-232/485. It is the responsibility of the receiving unit to complete the task outline below.

b. The receiving unit sends the RadNet Message to the instrument and the instrument processes the RadNet message. This approach would require the instrument be capable of understanding RadNet messages in serial format. The instrument would only need to look at byte 3 of the message to tell with what type of message it has received. Such as a TPC connected to an instrument. The TPC received the RadNet message form the network, it then passes the datagram portion of the packet to the serial port. The TPC does no translations of its own and does not check what the data stream contains (it up to the instrument to provide this support), it would pass the data stream onto the connected RS-232/485 instrument. It is the responsibility of the instrument to complete the tasks outline below.

c. The instrument does not support this option; in this case the receiving unit ignores the RadNet message. This may be done because of security reasons. The instrument would only push data onto the network because the end user does not want the instrument to accept any commands from the network. If this is done to meet security concerns, it maybe appropriate to remove the receive wire from the serial connection. This way you can be assure that no data can get to the instrument. Because the message is ignored, the device would not perform the tasks outlined below.

*** A TPC is an embedded device that converts RS-232/485 to Ethernet or Wireless using TCP/IP or UDP/IP. Their purpose is to take a serial communication data stream and place it into the datagram section of the protocol (See TCP/IP or UDP/IP RFC for more information) and forward it across the network. They also are capable of receiving data streams from the network and passing the data to a RS-232/485 instrument. Some examples of these devices are the Aquila RadCom, Lantronic MSS-1, Eberline TPC, etc.**

Upon receiving this command the instrument would perform a check source on itself. If the instrument is incapable of performing a source check, it will ignore this command. RadNet does not specify what constitute a *source check, how an instrument passes or fails a source check, or how the instrument accomplishes this task. It is also the responsibility of the instrument manufacture/end user to determine what constitutes a failure (with regards to a source checking of the instrument).

* For radiation detection instrumentation, this may require a source to be moved in front of the detector for a specific time and could require the results be compared to a store value within the instrument. For a biological system, it may require a value to open with known sample concentration. What RadNet is concerned with is if the instrument has passed this test and the results. See the appropriate industry standards or manufacture manual for specific requirements.

The instrument should change its operational status (code 23) to indicate it is entering the check source mode state. Upon enter this state; the instrument will start pushing data at the abnormal push rate until the check source task is accomplished. While the

instrument is performing the source check, it will use the appropriate RadNet message to forward results of the check source information.

When the instrument completes the source check, it will change its operational status from check source mode (Code 23), to a check source results (Code 38) state. It will also include the final results or the check source results using the appropriate protocol message. This message will be pushed as soon as the instrument completes the check source test. The instrument will then return to the previous state and push rate.

Another option that a manufacturer could provide is: As the instrument encounters errors/problems, it could send out a message indicating the error/problem it found. Each individual manufacturer is responsible for providing this functionality. The error is indicated by setting the **HW/OP Status** codes in the **RadNet Header** to appropriate value.

At no time is the instrument allowed to stop/discontinue pushing data at the normal/abnormal push rates. However, the instrument would indicate that the check source is being performed by the instrument using the HW/OP status codes in the RadNet Header (see comments above).

If the instrument failed the source check, then the instrument will start pushing data at the abnormal push rate and use the appropriate code to indicate the failure(s). If the instrument passes the source check, then it will return to the previous push rate and status codes.

For example:

> If the normal push rate is once every 5 min and the abnormal push rate is once every second, and the check source time is time is set to 2 minutes. The instrument pushes a (at the abnormal push rate) standard RadNet Gamma Area Message for the next two minutes. At the end of the two minutes, the instrument will ship its final results to the client computer (or broadcast the data) and return to the normal push rate. If the instrument capable of determining if the instrument passed or failed and the instrument failed the source check, then it will continue to push the data at the abnormal push rate with the appropriate HW/OP codes set.

If the instrument requires human intervention (manually placing the source into the instrument or placing the instrument check source mode) and if the instrument supports shipping RadNet check source packets, then the only difference is a client computer would not ship a Check Source Message. Once the instrument detects that it is being placed (an individual pushes a button on the instrument and places the source into the instrument) in a check source mode/state, it will perform the actions as outlined above.

CAUTION:

> If the monitoring computer and/or the instrument uses the same port (such as 16367) to send or receive data at a high push rate (instrument .1 second push rate), then data loss can occur. A .1 second normal push rate only allows for a very small window of opportunity to gain access to the instrument. Most instruments are simple 8 or 16 bit processor-based, incapable of spawning threads to handle multiple requests from the network.
>
> Subsequently the network will be impacted because of network error messages. The error message generated by the network will say “destination port unreachable”. This error message is saying that the port is being used at the same time access is being requested. The logical course of action would *seem* to be to increase the push /requests rates. This approach, however, will only increase the network problem and could even bring the network down. Instead, it is appropriate to decrease the push/request rate. Increasing or using very high push rates is only appropriate when full knowledge of the network/instrument capacity is known and its affects are understood.
>
> It is important to remember that the major limiting factor for RadNet is finite value of network bandwidth. Every message and every computer/instrument has an effect on the network and its available bandwidth. Therefore, every user, every computer and every instrument must utilize the network effectively. If RadNet has it own network infrastructure (Intranet), then there is also total control over the network and bandwidth usage. However, if RadNet is running on top or within existing infrastructure and/or connecting to the Internet, then network usage becomes important. As the network usage (bandwidth usage) increases, so does the number of collisions on the network that can lead to a network failure. If the

RadNet Source Check Message

2/19/2004 8:55 PM

RadNet normal/abnormal push rate is once every 5/1 minute(s), then there is plenty of open space (time) for a request to get through to the instrument.

Just because data can be pushed at .1 second and the network can handle it, doesn't mean it should. The push rate of the data should be based upon the instrument having valid data, how smart the instrument is, and its affect on the network during an event. It is necessary to allow enough bandwidth so that all of the instrument(s) can push at the abnormal push rates with network bandwidth to spare (<= 50% of the network bandwidth). RadNet makes use of the fact that instruments have become smarter and can detect when and if they have a problem. This important fact should also be used to determine the push rate of an instrument. The RadNet system should be tuned (push rates adjusted) to make sure there is plenty of reserved network bandwidth for an event (all instruments go into abnormal push rates). This scenario should be tested before going into production.

One way to prevent the bandwidth problem is to use two UDP ports for the network interface. Instruments can use port 16367 to send data and 16368 to receive requests. The monitoring computer can use port 16367 to receive data and port 16368 to transmit commands or requests. This distribution allows the instruments to continue to push data at high rates and still be able to receive request at the same time.

Instrument manufacturers can support the two-port option by being able to set the send/receive port parameters. If both parameters are set to 16367, then the instrument can only use one UDP port send/receive data. However, if the send parameter is set to 16367 (send/push data port) and the receive port is set 16368 (listen port) the instrument then requires two parameters. For a more secure interface, the listen port should only allow a certain IP address to pass requests. The instrument should check the incoming request against it list of IP addresses (MAC addresses can also be used). If the requesting IP address is not on this IP list, then the instrument can ignore the request. This technique is called IP filtering and is a common practice in the network world. To secure the instrument further, the listen option should also be selectable. Selectable means that the instrument will not allow anyone to gain access (request or send commands) to it and will only transmit data to the network. This option is valuable to any instrument that is not behind a secure firewall.

Field Name	Type	Position	Codes	Notes
Header Check Sum	Byte	1		The first byte (01, byte) is a check sum, to ensure the integrity of the header transmission. The check sum is the sum of bytes 2 through 3
RadNet Version Number	Byte	2	See RadNet Versions Page	The second byte (02, byte) is the RadNet version number. This number is used to indicate the version of the RadNet message. The receiving software is responsible for handling all received RadNet messages, although the most current version's functionality may not be provided.
Message Codes	Byte	3	See RadNet Message Codes Page	Byte (03) is the message code. The message code tells what type of RadNet message has been sent (status, check source, etc.). Value = 3, Check Source

RadNet Source Check Message

2/19/2004 8:55 PM

Example of Check Source Message Format:

The following is an example of how a Check Source Message would work. This message could be sent to and individual instrument or broadcasted to several instruments on the network.

At mid-night a computer may broadcast this message onto the network to all instruments on the network. Any instrument capable of receiving a RadNet Check Source Message would perform this task. This would allow monitoring computer to capture this information and archive the data. In a truly automated system, a report would be generated informing the facility when instruments passed or failed the check source by the time they came into work the next morning.

RadNet Field	Start Byte Position	End Byte Position	Notes
Start Of RadNet Header			
Header Check Sum	1	1	The check sum is calculated using byte 2 to 3.
RadNet Version	2	2	Value = 0
Message Code	3	3	Value = 3, Check Source
End Of RadNet Header			

Example of Area Monitor Final Check Source Result Message Format:

The instrument ships this data format upon exiting the check source state or when the required time has elapsed.

RadNet Field	Start Byte Position	End Byte Position	Notes
Start Of RadNet Header			
Header Check Sum	1	1	The check sum is calculated using byte 2 to 55.
RadNet Version	2	2	Value = 0

RadNet Source Check Message

2/19/2004 8:55 PM

Message Code	3	3	Value = 0, standard RadNet message
Server Address	4	5	Value = 1 to 65535. This setting is user defined and must be unique to each instrument on the network.
Monitor Address	6	6	Value = 1 to 255 This setting is user defined and must be unique to each instrument on the network.
Server Status	7	7	Value = 0
Hardware Status	8	8	Value = 0
Operational Status	9	9	**Value = 38, Check Source Results**
Location	10	49	Value = “Gamma Area Bldg 10, Room 143, SN 19384*** “ * = ASCII Character Value 32 (blank space)
Authentication Byte Count Offset	50	51	Value = 0, No authentication is being done.
Authentication Status	52	52	Value = 0, No authentication is being done
R1	53	53	No used at this time
Monitor Type	54	55	Value = 1, Neutron Area Monitor
End Of RadNet Header			
Start of Area Monitor Body			
Number of Channels	56	57	Value = 1
End Of Area Monitor Body			
Start Of Area Monitor Footer (Repeating Frames)			
Channel Number	58	59	Value = 0
Channel Type	60	60	Value = 3, Neutron
Channel Hardware Status	61	61	Value = 0, Normal

RadNet Source Check Message

2/19/2004 8:55 PM

Channel Operational Status	62	62	Value = 38, Check Source Results
Reading	63	66	Value = 4.5
Units	67	67	Value = 1, Rem/hr
End Of Measurement 0 Data			
Channel Number	68	69	Value = 1
Channel Type	70	70	Value = 3, Neutron
Channel Hardware Status	71	71	Value = 0, Normal
Channel Operational Status	72	72	Value = 38, Check Source Results
Reading	73	76	Value = 1.2
Units	77	77	Value = 1, Rem/hr
End Of Measurement 1 Data			
Channel Number	78	79	Value = 2
Channel Type	80	80	Value = 3, Neutron
Channel Hardware Status	81	81	Value = 0, Normal
Channel Operational Status	82	82	Value = 38, Check Source Results
Reading	83	86	Value = 8.7
Units	87	87	Value = 1, Rem/hr
End Of Measurement 2 Data			
Channel Number	88	89	Value = 3
Channel Type	90	90	Value = 9, Temperature
Channel Hardware Status	91	91	Value = 0, Normal
Channel Operational Status	92	93	Value = 38, Check Source Results
Reading	94	95	Value = 33
Units	96	97	Value = 6, Degrees Centigrade
End Of Measurement 3 Data			
End Of Area Monitor Footer (Repeating Frames)			

RadNet Source Check Message

2/19/2004 8:55 PM

Example of Area Monitor Check Source Status Message Format:

The instrument ships this data format (at the abnormal push rate) upon entering the check source state or until the required time has elapsed.

RadNet Field	Start Byte Position	End Byte Position	Notes
Start Of RadNet Header			
Header Check Sum	1	1	The check sum is calculated using byte 2 to 55.
RadNet Version	2	2	Value = 0
Message Code	3	3	Value = 0, standard RadNet message
Server Address	4	5	Value = 1 to 65535. This setting is user defined and must be unique to each instrument on the network.
Monitor Address	6	6	Value = 1 to 255 This setting is user defined and must be unique to each instrument on the network.
Server Status	7	7	Value = 0
Hardware Status	8	8	Value = 0
Operational Status	9	9	**Value = 23, Check Source Mode**
Location	10	49	Value = “Gamma Area Bldg 10, Room 143, SN 19384*** “ * = ASCII Character Value 32 (blank space)
Authentication Byte Count Offset	50	51	Value = 0, No authentication is being done.
Authentication Status	52	52	Value = 0, No authentication is being done
R1	53	53	No used at this time
Monitor Type	54	55	Value = 1, Neutron Area Monitor
End Of RadNet Header			

RadNet Source Check Message

2/19/2004 8:55 PM

Start of Area Monitor Body			
Number of Channels	56	57	Value = 1
End Of Area Monitor Body			
Start Of Area Monitor Footer (Repeating Frames)			
Channel Number	58	59	Value = 0
Channel Type	60	60	Value = 3, Neutron
Channel Hardware Status	61	61	Value = 0, Normal
Channel Operational Status	62	62	Value = 23, Check Source Mode
Reading	63	66	Value = 4.5
Units	67	67	Value = 1, Rem/hr
End Of Measurement 0 Data			
Channel Number	68	69	Value = 1
Channel Type	70	70	Value = 3, Neutron
Channel Hardware Status	71	71	Value = 0, Normal
Channel Operational Status	72	72	Value = 23, Check Source Mode
Reading	73	76	Value = 1.2
Units	77	77	Value = 1, Rem/hr
End Of Measurement 1 Data			
Channel Number	78	79	Value = 2
Channel Type	80	80	Value = 3, Neutron
Channel Hardware Status	81	81	Value = 0, Normal
Channel Operational Status	82	82	Value = 23, Check Source Mode
Reading	83	86	Value = 8.7
Units	87	87	Value = 1, Rem/hr
End Of Measurement 2 Data			

RadNet Source Check Message

2/19/2004 8:55 PM

Channel Number	88	89	Value = 3
Channel Type	90	90	Value = 9, Temperature
Channel Hardware Status	91	91	Value = 0, Normal
Channel Operational Status	92	93	Value = 23, Check Source Mode
Reading	94	95	Value = 33
Units	96	97	Value = 6, Degrees Centigrade

End Of Measurement 3 Data

End Of Area Monitor Footer (Repeating Frames)

Standard RadNet Header Codes

2/19/2004 8:55 PM

Authentication Status Codes

See the following pages for more information concerning RadNet Security Implementation:

Background Information
RadNet Security Implementation
Authentication
Encryption

These codes indicate whether a RadNet message has been authenticated (message fails signature verification). RadNet message(s) are directed to/at a RadNet Authentication Server (RAS) or other device. The RAS will authenticate the message and set byte 52 to indicate the status of the authentication process. The RAS server will then forward the message to clients on the network. It is important that the RAS server is secure and that the data leaving the RAS server is on a secure network (the message will not be tampered with after authenticated). It is also important to note that the RAS server does not strip the authentication keys from the message, and the authentication process could be done at any time, including storing the authentication signature within a database for future verification of the message.

The Authentication software/server will set this byte value to indicated message signature verification status.

Code	Meaning	Notes
0	Message is Ok	
>0	Message fails signature verification.	

Standard RadNet Header Codes

2/19/2004 8:55 PM

RadNet Channel Types

Below is a code for type of channel.

Code	Meaning	Notes
0	Alpha	
1	Beta	
2	Gamma	
3	Neutron	
4	Iodine	
5	Noble Gas	
6	Tritium	
7	Stack Flow	
8	Sample Flow	
9	Temperature	
10	Sample Pressure	
11	Leak rate	Primary to secondary, or containment building leak
12	Reactor power	Used for leak measurements
13	Beta + Gamma	The sum of the beta and gamma channels.
14	Latitude	
15	Longitude	
16	Altitude	
17	Humidity	
18	Wind Speed	
19	Wind Direction	
20	Alpha/Beta	
21	Pulse Height Analysis (PHA)	
22	Dust Particle	
23	Humidity	
24	Anemometer	

Standard RadNet Header Codes

2/19/2004 8:55 PM

RadNet Monitor Type Codes

Bytes (54-55) are code for the instrument type.

Code	Meaning	Notes
0	Gamma Area Monitor	Uses the Area Monitor body and footer format. See Area Monitor Header, Body, Footer, and Notes for more information.
1	Gamma Crit Monitor	Uses the Area Monitor body and footer format. See Area Monitor Header, Body, Footer, and Notes for more information.
2	Neutron Area Monitor	Uses the Area Monitor body and footer format. See Area Monitor Header, Body, Footer, and Notes for more information.
3	Neutron Crit Monitor	Uses the Area Monitor body and footer format. See Area Monitor Header, Body, Footer, and Notes for more information.
4	Alpha CAM	Uses the Alpha CAM body, Measurement Footer, Spectrum Footer. See Alpha CAM Header, Body, Measurement Footer, Spectrum Footer and Notes for more information.
5	Beta CAM	Uses the Beta Cam body and footer format. See Beta CAM Header, Body, Footer and Notes for more information.
6	PCM Monitor	Uses the PCM body and footer format. See PCM Header, Body, Footer and Notes for more information.
7	PCM Portal Monitor	Uses the PCM Body and Footer format. See Portal Header, Body, Footer and Notes for more information.
8	PING	Uses the PING Body and Footer format. See PING Header, Body, Footer and Notes for more information.
9	Glove Box Monitor/Hand Monitor	Uses The PCM Body and Footer format. See PCM Header, Body, Footer and Notes for more information.

Standard RadNet Header Codes

2/19/2004 8:55 PM

10	Hand And Foot Monitor	Uses The PCM Body and Footer format. See Hand and Foot Header, Body, Footer and Notes for more information.
11	Generic Sensor	Uses The Generic Sensor Body and Footer format. See Generic Sensor Header, Body, Footer and Notes for more information.
12	Electronic Reading Dissymmetry	See Header, ERD Body, ERD Footer, for more information.
13	Item Contamination Monitor (ICM)	Uses The ICM Body and Footer format. See Header, Body, Footer and Notes for more information.
14	Radiation Gateway Monitor	Uses The Radiation Gateway Body and Footer format. See Header, Body, Footer and Notes for more information.
15	Gamma Spectrum	Uses The Gamma Spectrum Body, Measurement, Spectrum, Status and Footer format. See Header, Body, Measurement, Spectrum, Status and Notes for more information.
16	Portable Instruments	Protocol Pending, in development by vendor
17	Meteorology Tower	Uses The Meteorology Tower Body and Footer format. See Header, Body, Measurement, Status, and Notes for more information.
18	Video	Uses The Video Body, Status and Footer format. See Header, Body, Footer, Status and Notes for more information.
19	Image	Protocol Pending, in development by vendor
20	Audio	Protocol Pending, in development by vendor
21	Security data tag/seal	Protocol Pending, in development by vendor
22	Tritium Air Monitor	Protocol Pending, in development by vendor
23	Dust Particle Monitor	Protocol Pending, in development by vendor

Standard RadNet Header Codes

2/19/2004 8:55 PM

RadNet Message Codes

Byte (03) is the message code. The message code indicates what type of RadNet message has been sent (status, check source, etc.).

Code	Meaning	Notes
0	Normal/Standard RadNet Message	Message is pushed by the instrument and received by the clients.
1	Alarm Ack	Message is pushed by the clients and received by the instruments. See Alarm Acknowledge Alarm Msg. Notes and Alarm Acknowledge Header Format
2	Pass Through	Message is pushed by the instrument and received by the client or can be pushed by the client and received by the instrument. This method can be used for bi-directional communication by the clients and instruments. See Pass Through Msg. Header Notes / Pass Through Header Format or Pass Through Codes
3	Check Source	Message is pushed by the clients and received by the instruments. See Check Source Msg. Notes and Check Source Header Format
4	Diagnostic/Self-Check	Message is pushed by the clients and received by the instruments. See Diagnostic/Self-Check Msg. Notes and Diagnostic/Self-Check Header Format
5	Request Data	A client/server sends this request to an instrument. In response to this request the instrument will send its current information (Normal RadNet Message). See Request Data Notes and Request Data Header Format
6	Update/Request Date/Time	A client/server sends this request to an instrument. In response to this request the instrument will send/set the date/time. See Update/Request Date/Time Notes and Update/Request Date/Time Header Format
7	Acknowledge Receipt	This message is used by the monitoring computer to acknowledge receipt of data from an instrument. See Acknowledge Receipt Message Header Format and Acknowledge Receipt Message Notes for more information.
255 (FFh)	Encrypted RadNet Message	See the following pages for more information: Background Information RadNet Implementation

Standard RadNet Header Codes

2/19/2004 8:55 PM

		Encryption Header Message Format Encryption Background Information

Standard RadNet Header Codes

2/19/2004 8:55 PM

RadNet Operational and Hardware Status Codes

Note: It is the responsibility of the instrument manufacturer to prioritize the operational and hardware status for the instrument. Any status code can be used either as an operational or hardware status code base upon the instrument usage or needs.

Below is a code used to display the Hardware/Operational Status of the instrument. Hardware status is intended to be a troubleshooting guide when responding to an abnormal condition. Instrument hardware malfunctions generally require repair work. Other conditions may be attributed to either hardware or operational problems. Instrument vendors are responsible for classifying conditions and prioritizing the status change. The intention is that only the most critical status change be pushed; however a series of messages based upon a list of status changes could also be pushed. For example: If the instrument detected failures with low voltage and low background, the vendor could push each status in a separate message (at the abnormal push rate). These statuses could then be interpreted by the client as an HV power supply failure.

OP = Guide For Operational Status Use
HW = Guide For Hardware Status Use

Code	Meaning	OP	HW	Notes
0	Normal	Y	Y	
1	High Alarm	Y	N	
2	HV Fail	N	Y	
3	Count Fail	Y	N	
4	Bkg Fail	Y	N	
5	Bkg Update	Y	N	
6	Comm Fail	N	Y	
7	Gas Empty	Y	N	
8	Buffer Full	Y	Y	
9	Acked High Alarm	Y	N	
10	Flow Fail Low	Y	Y	
11	Flow Fail High	Y	Y	
12	Filter Door Open	Y	N	
13	Instrument Not Ready	Y	Y	
14	Instrument In Calibration Mode	Y	Y	
15	Fast Concentration Alarm	Y	N	
16	Slow Concentration Alarm	Y	N	
17	DAC Hours Alarm	Y	N	
18	Count Rate Alarm	Y	Y	
19	Release Rate Alarm	Y	N	

Standard RadNet Header Codes

2/19/2004 8:55 PM

20	Fast Concentration Alarm Disabled	Y	N	
21	Slow Concentration Alarm Disabled	Y	N	
22	Count Rate Alarm Disabled	Y	N	
23	Check Source Mode	Y	N	
24	Out Of Service	Y	Y	
25	Alert Alarm	Y	N	
26	Trend Alarm	Y	N	
27	Not Initialized	Y	Y	
28	Standby	Y	Y	
29	Local Control	Y	Y	
30	Flush	Y	N	
31	Alarm Disabled	Y	N	
32	External Fail	Y	Y	
33	AC Off	Y	Y	
34	Crit Relay Fail	Y	Y	
35	Out Of Limits	Y	Y	
36	Crit Alarm	Y	N	
37	NV RAM Fail	N	Y	When the instrument's non-volatile RAM cannot be read/written.
38	Check Source Results	N	Y	Indicates that the message with this status carries check source results. This indicates that this message contains the final check source result at the completion of the check source integration. Prior to this code being sent the status code would be 23 (*Check Source Mode*).
39	Audio Failure	N	Y	Indicates that the instrument has a problem with its audio circuit.
40	Over Range	Y	Y	Indicates that the instrument has exceeded an Over Range value.
41	Diagnostic/Self-check completed, Passed self-check	Y	Y	Indicates that the instrument has performed an Internal Diagnostic/Self-check and found no error conditions. See Diagnostic/Self-Check Msg. Notes and Diagnostic/Self-Check Header Format

Standard RadNet Header Codes

2/19/2004 8:55 PM

42	Diagnostic/Self-check completed, Failed self-check	Y	Y	Indicates that the instrument has performed an Internal Diagnostic/Self-check and found error conditions. See Diagnostic/Self-Check Msg. Notes and Diagnostic/Self-Check Header Format
43	High/High Alarm	Y	N	Third alarm level used in many plants.
44	Internal stabilization failure	Y	N	From automatic energy stabilization.
45	Parameter error	Y	N	Bad setup.
46	Temperature failure	N	Y	Temperature out of operational range.
47	Power supply failure	N	Y	From power supply, or from voltage reading.
48	Analog input failure	N	Y	4-20 mA analog input failure (0 mA for example).
49	Filter failure	N	Y	Automatic filter advance failure (motor, end of roll…).
50	Detector cable failure	N	Y	
51	Electronic or Acquisition board failure	N	Y	Electronic failure.
52	Low Battery	N	Y	Backup battery or internal battery has a low voltage condition.
53	Battery Failed	N	Y	Backup battery or internal battery has failed.
54	Clock Failed	N	Y	Internal clock has failed.
55	User defined	Y	Y	This error code is used whenever an instrument supports user defined error codes. It is used whenever there is a desire to inform a user that one of their error conditions has been reached. Since there is no way of knowing what is contained in the error code logic, this generic response should be used to indicate the error.
56	Internal Communication Failure	N	Y	

Standard RadNet Header Codes

2/19/2004 8:55 PM

RadNet Versions

Note: The last approved version in this list is the current version in use by RadNet.

The second byte (02, byte) is the RadNet version number. This number is used to indicate the version of RadNet be pushed by the server. It is the responsibility of the receiving software to handle all received RadNet messages, although the most current version's functionality may not be provided.

Version	Date Approved	Notes
0	Approved	

Standard RadNet Header Codes

2/19/2004 8:55 PM

RadNet Units Codes

Below is a code for the RadNet units of the reading.

Code	Meaning	Notes
0	cps	
1	Rem/hr	
2	R/hr	
3	Sv/hr	
4	Bq/cm3	
5	Bq	
6	Degrees Centigrade (C)	Temperature Unit
7	Pascal (Pa)	Pressure Unit
8	cc	Flow Volume Unit
9	cc/sec	Flow Rate Unit
10	cps/cc	Activity Unit
11	counts	Counting Events Unit
12	cm/sec	Velocity Unit
13	bqMeV/cc	Gamma Gas Activity
14	degrees	Wind Direction (180 = south)
15	Gy/hr	Dose Rate Unit
16	RPU%	Reactor Power Unit
17	Kg/sec	Masse flow rate
18	n/cm2	Neutrons / cm2
19	n/cm3	Neutrons / cm3
20	DAC	Derived Air Concentration
21	bq/m3	Becquerel per cubic meter
22	bq/kg	Becquerel per kilogram
23	Latitude	
24	Longitude	
25	Mu_Hemin	Hemisphere North
26	Mu_Hemis	Hemisphere South
27	Mu_Hemie	Hemisphere East
28	Mu_Hemiw	Hemisphere West
29	Mu_Knots	Wind Speed (knots)
30	Mu_KPH	Wind Speed (knots per hour)
31	Mu_MPS	Wind Speed (meters per second)
32	Mu_MPH	Wind Speed (meters per hour)

Standard RadNet Header Codes

2/19/2004 8:55 PM

33	Mu_METERS	Altitude (meters)
34	Mu_Feet	Altitude (feet)
35	Mu_Percent	Humidity
36	Resistance	Electrical Resistance
37	µm	Micro-meter

Standard RadNet Header Codes

2/19/2004 8:55 PM

RadNet Server Status Codes

Byte (7) is a code that displays the status of the server. Codes are provided for normal as well as a variety of abnormal conditions. See Appendix A for Server Status message codes.

Code	Meaning	Notes
0	Normal Operation	
1	Instrument Communication Error	
2	TCP Communication Error	
3	UDP Communication Error	
4	Hard Disk Full	
5	Password Fail	
6	Starting Up	
7	Shutting Down	
8	Program Error	
9	NetWork Access Granted	
10	NetWork Access Denied	